AMENDMENTS TO THE CLAIMS

1. (original) A scotch yoke fluid device which includes:

a crank including a big end having an axis which orbits about a main axis for the crank; connecting means mounted on the big end axis;

at least one piston mounted for reciprocal motion in a cylinder along a piston axis, the piston having a cross-sectional area perpendicular to the piston axis, the piston having guide means including a linear surface transverse to the piston axis, the guide means engaging engagement means on the connecting means; and

at least one restricting means for constraining the piston to move along the piston axis;

wherein the piston guide means bisects the piston cross-sectional area and at least part of each restricting means is located within a volume defined by the piston cross-sectional area projected along the piston axis, but is not located along the centre line of the bisection formed by the piston guide means.

2 – 15. (cancelled)

16. (currently amended) The device ~~of any one~~ of claim~~s~~ 1, ~~to 14,~~ wherein the linear surface and/or the engagement means includes two or more roller bearings and the guide means engages the engagement means on the connecting means by sliding.

17-18. (cancelled)

19. (currently amended) The device of claim ~~10~~ 129, wherein the pistons are arranged at equal angles about the main axis.

20 – 21. (cancelled)

22. (currently amended) The device of claim ~~21~~ 138, wherein the separate structure is pivotably mounted to the piston.

23. (currently amended) The device of claim 1 ~~or 10~~, wherein the main axis of the crank is fixed relative to the ~~or each~~ cylinder.

24. (currently amended) The device of claim 1 ~~or 10~~, wherein the main axis of the crank is movable relative to the ~~or each~~ cylinder, so as to alter the compression ratio and/or the timing of each piston in each cylinder.

25-34. (cancelled)

35. (currently amended) The device of claim ~~34~~ 148, wherein the crank includes a counterweight which substantially and/or dynamically balances the mass of the connecting means relative to the main axis.

36-101. (cancelled)

102. (currently amended) The device of claim ~~91~~ 170 wherein there are two pistons arranged in a pair, both pistons being positioned in a common plane perpendicular to the crank.

103. (currently amended) The device of claim ~~88~~ 169 wherein the linear surface extends diametrically through the cross-sectional area.

104 (currently amended) The device of claim ~~88~~ 169 wherein the linear surface is provided with lubrication by lubrication means.

105. (currently amended) The device of claim ~~91~~ 170 wherein the restricting means includes a web which has a cross-sectional shape chosen from the following: square, rectangular, elliptical, circular, arcuate, undulating, mushroom, rod and ~~"F"~~ F.

106. (currently amended) The device of claim ~~91~~ 170 wherein the restricting means has a length which extends above and below the scotch yoke element.

107. (currently amended) The device of claim ~~91~~ 170 which includes second restricting means being part of, mounted on or connected to the scotch yoke element and adapted to constrain the scotch yoke element to move along the longitudinal path.

108. (original) The device of claim 107, wherein the second restricting means is adapted to pivot.

109. (currently amended) The device of claim 1 ~~or 91~~, wherein the ~~or each~~ piston is mounted on an axis which is different from but perpendicular to the main axis.

110. (currently amended) The device ~~of any one~~ of claim~~s~~ 1, ~~51, 64, 69, or 91,~~ wherein the motion of the ~~or each~~ piston is simple harmonic motion.

111. (currently amended) The device of claim ~~47~~ 160 wherein the means for adjusting is pivotably mounted to the piston or the engagement means.

112-113. (cancelled)

114. (original) The device of claim 1, wherein the restricting means has a length which extends above and below the linear surface.

115. (currently amended) The device ~~of any one~~ of claim~~s~~ 1, ~~51, 64, 69, or 91,~~ wherein the device is part of an engine or pump.

116. (currently amended) The device ~~of any one~~ of claim~~s~~ 1, ~~51, 64, 69, or 91,~~ wherein the restricting means is restrained by means located in a volume defined by the area swept by the crank projected along the main axis of the crank.

117. (currently amended) The device of claim 1 ~~or 91~~ wherein there are two big ends, each having a big end axis, an angle D is formed between the first big end axis, the main axis and the second big end axis, the angle D being 0° or more, and wherein there are two piston arrangements, a first piston arrangement being on the first big end and the second piston arrangement being on the second big end, the first piston arrangement having a first piston axis and the second piston arrangement having a second piston axis, the angle between the first piston axis and the second piston axis being A, wherein, in balancing the device, the angle D is set at 2(A-90) degrees.

118 - 120. (cancelled)

121. (new) The device of claim 1, wherein the guide means includes surfaces which extend substantially perpendicularly to the respective piston axis.

122. (new) The device of claim 1, wherein the restricting means includes a pair of members and a line drawn from one member to the other of the pair is perpendicular to the center line of the bisection of the piston formed by the piston guide means.

123. (new) The device of claim 1 wherein the restricting means includes a member which is located on either side of the bisection formed by the piston guide means but not along the center line.

124. (new) The device of claim 1, wherein each piston has the restricting means formed integrally therewith.

125. (new) The device of claim 1, wherein each piston has the restricting means formed separately from and mounted on the piston.

126. (new) The device of claim 1, wherein the restricting means is slideably engaged in one or more slideways mounted on a block for the device.

127. (new) The device of claim 1, wherein there are two, three, four, five or six pistons.

128. (new) The device of claim 127, wherein each piston has two restricting means which are located symmetrically relative to the piston axis.

129. (new) The device of claim 1, wherein there are at least two such pistons, and wherein the guide means of the pistons are disposed on the same side of the big end axis.

130. (new) The device of claim 1, wherein the guide means engages the engagement means on the connecting means by sliding.

131. (new) The device of claim 1, wherein as the crank rotates, at lest one restricting means extends into a volume defined by the swept area of the crank projected along the main axis of the crank.

132. (new) The device of claim 1, wherein the linear surface is in a plane which is perpendicular to the respective piston axis.

133. (new) The device of claim 1, wherein the linear surface is in a plane which is other than 90° to the respective piston axis.

134. (new) The device of claim 132, wherein the engagement means includes two or more parallel linear surfaces which correspond and slide relative to the guide surfaces.

135. (new) The device of claim 134, wherein the linear parallel opposed guide surfaces are located on the connecting means and the engagement means are mounted on the piston.

136. (new) The device of claim 129, wherein there are two or three pistons mounted on slider means on each big end axis.

137. (new) The device of claim 129, wherein the guide means is integral with the piston.

138. (new) The device of claim 129, wherein the guide means is located on a separate structure mounted on the piston.

139. (new) The device of claim 1, wherein the main axis of the crank is movable relative to the at least one cylinder, wherein such movement results in a change in compression ratio without any change in phase.

140. (new) The device of claim 1, wherein the main axis of the crank is rotatable relative to the cylinder about an axis remote from the main axis, so raising or lowering the crank relative to the cylinder.

141. (new) The device of claim 1, wherein the crank is movable in a plane perpendicular to the at least one piston axis.

142. (new) The device of claim 1, wherein the connecting means has a non-rotary movement relative to the piston and the device including stabilizing means engaging the connecting means to limit the connecting means to a single orientation as it orbits the main axis.

143. (new) The device of claim 142, wherein the stabilizing means includes engagement of the connecting means with the piston.

144. (new) The device of claim 142, wherein the stabilizing means includes a separate linkage pivotably mounted to both the connecting means and a crankcase for the device.

145. (new) The device of claim 1, wherein the main axis of the crank is moveable along at least one path relative to the cylinder and the engagement means is configured such that the piston is neither substantially retarded nor advanced when the main axis of the crank is moved along said path.

146. (new) The device of claim 145, wherein the main axis of the crank moves along a linear path.

147. (new) The device of claim 145, wherein the main axis of the crank moves along an arc.

148. (new) The device of claim 1, wherein the connecting means has a center of mass located on or adjacent to the big end axis.

149. (new) The device of claim 1, wherein the crank has an effective center of mass which, together with the connecting means and the piston, remains stationary or substantially stationary relative to the main axis as the crank rotates.

150. (new) The device of claim 1, wherein the device has at least two such pistons, wherein the configuration of the connecting means and the engagement means is such that the motion of each piston is simple harmonic motion.

151. (new) The device of claim 1, wherein the device has at least one pair of such pistons, wherein each pair of pistons has a mass the motion of which is equivalent to a single mass orbiting in an orbit.

152. (new) The device of claim 151, wherein the orbit is a circle.

153. (new) The device of claim 151, wherein the orbit is an ellipse.

154. (new) The device of claim 151, wherein the motion of each of the pistons is simple harmonic motion.

155. (new) The device of claim 1, wherein the big end and the connecting means are combined in the form of a circular cam.

156. (new) The device of claim 155, wherein there are two such pistons.

157. (new) The device of claim 156, wherein the piston axes are at an angle to each other.

158. (new) The device of claim 157, wherein the angle is 60°, 72°, 90°, 120° or 180°.

159. (new) The device of claim 1, which includes means for adjusting the distance between the piston and the engagement means.

160. (new) The device of claim 159 wherein the means for adjusting includes a connecting rod mounted to the piston and the engagement means.

161. (new) The device of claim 1, wherein, at top dead centre, the main axis lies between the piston and the piston guide means.

162. (new) The device of claim 1, wherein, when the piston is at top dead centre, a line joining the main and big end axes is parallel to and spaced from the piston axis.

163. (new) The device of claim 162, wherein when the one of the pistons is at top or bottom dead centre, a line joining the main and big end axes is parallel to and spaced from the respective piston axis of the one piston.

164. (new) The device of claim 132, wherein the linear surface and/or the engagement means includes two or more roller bearings and the guide means engages the engagement means or the connecting means by rolling or by both rolling and sliding.

165. (new) A piston-type fluid device which includes:

a crank having a main axis and including a big end member having an axis which rotates around the main axis;

at least one piston arrangement having at least one piston mounted for reciprocal motion in a cylinder along a piston axis, the piston having a cross-sectional area perpendicular to the piston axis;

at least one follower located between the member and the piston for transferring motion of the member to the piston, the follower reciprocating along a linear path, having a centre line, between two end points; and

at least one restricting means for constraining the piston to move along the piston axis;

wherein at least part of each restricting means is located within a volume defined by the piston cross-sectional area projected along the piston axis, but is not located on the centre line between the two end points.

166. (new) A fluid device, which includes:

a crank including a big end having an axis which orbits about a main axis for the crank;

connecting means mounted on the big end axis;

at least one pair of pistons, each piston being mounted for reciprocal motion in a respective cylinder along a respective piston axis, the piston axes of each pair being at 90° to each other, each piston engaging engagement means on the connecting means;

wherein each pair of pistons has a mass the motion of which is equivalent to a single mass orbiting in an orbit;

the centre of mass of the connecting means is located on or adjacent the big end axis; and

the crank includes a counter weight located generally diametrically opposite the big end and a centre of mass remote from the crank axis, the counter weight including the equivalent of:

a first mass to statically and/or dynamically balance all or part of the mass of the big end bearing relative to the crank axis;

a second mass to statically and/or dynamically balance all or part of the mass of the connecting means relative to the crank axis; and

a respective third mass to statically and/or dynamically balance all or part of the mass of each pair of pistons relative to the crank axis.

167. (new) A fluid device, which includes:

a crank including a big end having an axis which orbits about a main axis;

connecting means mounted on the big end axis;

at least one piston mounted for reciprocal motion in a cylinder along a piston axis;

intermediate connecting means interconnecting the at least one piston with the connecting means; and

means for adjusting the position of the intermediate connecting means relative to the at lest one piston or the connecting means or both.

168. (new) A yoke assembly for a scotch yoke type fluid device having opposed pistons reciprocating in opposed cylinders having parallel cylinder axes, the yoke assembly mounted on the two pistons and including an engagement portion for receiving an engagement member rotatably mounted on a big end of a crank shaft and in which the engagement member reciprocates as the crank rotates, said engagement portion being split into two parts.

169. (new) A piston arrangement for a fluid device, the arrangement including:

a piston mounted for reciprocal motion in a cylinder along a piston axis, the piston having a cross-sectional area perpendicular to the piston axis, the piston having guide means including a linear surface the plane of which is transverse to the piston axis, the guide means adapted to engage engagement means on a connecting means mounted on a big end axis; and

at least one restricting means for constraining the piston to move along the piston axis;

wherein the piston guide means bisects the piston cross-sectional area and at least part of each restricting means is located within a volume defined by the piston cross-sectional area but not along the centre line of the bisection formed by the piston guide means.

170. (new) A scotch yoke fluid device which includes:

a crank including a big end having an axis which orbits around and is parallel to a main axis for the crank;

at least one piston arrangement which includes:

a piston mounted for reciprocal motion in a cylinder along a piston axis which is in a plane substantially perpendicular to the big end axis and the main axis, the piston having a cross-sectional area which is perpendicular to the piston axis; and

a scotch yoke element chosen from the group comprising a channel, a rail, a channel and a rail, a bore and a bore and a rail, the element defining a longitudinal path, the big end reciprocating along the path relative to the piston between two end points, the scotch yoke element being integral with the piston or connected thereto via connecting rod means; and

restricting means adapted to move along a defined path and to constrain one or more of the piston, the scotch yoke element and the connecting rod means to move along the defined path,

characterized in that at least part of the restricting means is located transversely of the longitudinal path of the scotch yoke element and within a volume defined by the piston cross-sectional area, projected along the piston axis.